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The Evaluation of Performance Indicators in the Health Care Centers of Babol University of Medical Sciences by the Pabon Lasso Model (2011-2014)

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ABSTRACT

BACKGROUND AND OBJECTIVE: Performance indicators are the essential tools for measuring the efficiency of hospital services. Therefore, this study aimed to evaluate the effectiveness of performance indicators by the Pabon Lasso Model in the teaching hospitals of Babol affiliated with Babol University of Medical Sciences.

METHODS: This experimental study was conducted using a descriptive method and the performance indicators of the Pabon Lasso Model from 2011 to 2014 in four major medical centers and hospitals of Babol University of Medical Sciences (Beheshti, Ayatollah Rohani, Yahyanejad and Children's Hospital of Amirkola). Data were extracted from the monthly database of the Ministry of Health consisting of the inpatient bed occupancy rate, bed turnover rate, bed turnover interval and the patients' average length of stay. The collected data were evaluated according to the criteria of the Health Ministry.

FINDINGS: In 2011, the Children's Hospital of Amirkola and Ayatollah Rohani Hospital accounted for the highest (75.74%) and the lowest (69%) bed occupancy rate, respectively. In 2014, the highest rate of bed occupancy was observed in Ayatollah Rohani Hospital (82%). The comparison of the indices by the Pabon Lasso Model indicated that all the four surveyed centers were located in the third area of the diagram from 2011 to 2014.

CONCLUSION: In general, the indicators surveyed in this study appeared to be desirable compared to the criteria of the Ministry of Health, with the exception of the patients' average length of stay. Thus, further attempts are required as to reduce the average length of stay in the patients.

KEY WORDS: Performance Indicators, Hospital, Pabon Lasso, Bed Occupancy Rate.

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Introduction

Nowadays, promoting the quality of treatment and achieving the highest standards of health care are among the essential goals of health organizations (1). In the field of health care, ample resources as well as comprehensive, relevant and updated knowledge are required for efficient management (2, 3).

As proposed by the World Health Organization (WHO) (1985), hospitals are required to provide their services by referring to a systematic database depending on the needs of a community (5). Therefore, implementing a standard management information system is a priority in this section (6). An efficient database is able to obtain adequate evidence for the decision-makings of the department of management (7). Indicators are a direct result of a practical information system (6).

Indicators are the quantifiable criteria for measuring the performance of hospital services (8, 9) and they are the essential tools for evaluating performance and productivity in general (10). Such examples of performance indicators in hospitals are bed occupancy rate, patient's average length of stay, bed turnover rate and bed turnover interval (8). In developing countries, more than 5% of the gross domestic products (GDP) and approximately 5-10% of the government spending are allocated to health care services and hospitals expend up to 50-80% of the total cost (11).

Regarding the substantial budget allocated to the health sector, constant evaluation of hospital services is of paramount importance (12). The Pabon Lasso Model is a combination of three performance indicators including the bed turnover rate, bed occupancy rate (BOR) and the patient's average length of stay. This model is used for assessing the performance of hospital services. The horizontal axis of this graphical model (table 1) marks BOR and the vertical axis signifies the bed turnover rate (12-14).

In this evaluation, if a hospital is categorized under a desirable area, performance assessments are indicative of efficient health care services in that center. In this model, the patient's average length of stay is determined by connecting the curvilinear coordinates to the center coordinates and continuing it to the front side of the diagram (7).

In this regard, Goshtasbi et al. investigated the performance of 6 general hospitals in Yasuj University of Medical Sciences (YUMS) (15). Furthermore, Bahadori et al. investigated health care services in the hospitals affiliated to Orumieh University of Medical Sciences (16) and Asbo et al. surveyed the hospitals in Malawi using the Pabon Lasso Model (17).

Table 1. Four Areas of the Pabon Lasso Model

3rd Area: BOR High Turnover Rate No flat bottom Work fairly well	**2nd Area:** BOR Low Turnover Rare Flat Top places flow (short-term inpatient centers and maternity hospitals) Increased number of hospital beds Little need for the development of the hospital or the creation of new hospitals in the area
4th Area: BOR Low Turnover Increased number of hospital beds Low demand for inpatient services Little need for the development of hospital or the creation of new hospitals in the area Mismanagement and lack of motivation in the personnel, esp. physicians, No admission, guidance and referrals to other centers	**1st Area:** BOR High/Low Turnover Rate High prevalence of severe diseases Prolonged hospitalization Unnecessary prevalence of chronic diseases

In another study, Zahiri et al. investigated 26 hospitals of Jondi Shapour Medical University in Ahwaz (13). Similarly, Mehr-al-Hassani et al. examined the quality of health care services using the Pabon Lasso Model in the public and private hospitals of Kerman (18). The health sector needs to be evaluated with regularity and by upgraded means.

The Pabon Lasso Model provides a realistic assessment of the current situation in order to offer efficient health care services. Therefore, this study aimed to survey the performance of the teaching hospitals affiliated to Babol University of Medical Sciences during the past 4 years and compare them with the most significant performance indicators of the Ministry of Health.

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Methods

This experimental study was conducted using the performance indicators of four different hospitals affiliated to Babol Medical University (Beheshti, Yahyanejad, Ayatollah Rohani and Amirkola) from 2011 to 2014. Using the standard form of monthly activities of Health Care Center 201-1 and after obtaining the approval of the Vice Chancellor of the university, the required data were collected by the researcher from 2011 to 2014.

In order to achieve more accuracy and coordinate the results, the required indicators were calculated by Excel 2007 software. These indicators were classified into three groups of desirable, average and poor according to the guidelines of the Ministry of Health (table 2) (8). All of the studied medical centers were compared with the standards of the ministry during a 4-year period. Finally, the performance charts of these health centers were drawn using the three indicators of BOR, bed turnover rate and patient's average length of stay according to the Pabon Lasso Model.

Table 2. Comparison of Performance Indicators in the Teaching Hospitals of Babol University of Medical Sciences with the standards of the Ministry of Health

Indices	Desirable	Average	Poor
BOR (%)	>70	60-70	<60
bed-performance ratio	>24	17-24	<17
bed turnover interval (days)	<2	2-3	>3
average patient's length of stay (days)	<3/5	3/5-4	>4

Findings

According to the findings of this study, the Children's Hospital of Amirkola accounted for the highest bed occupancy rate (75.74%) in 2011 while the lowest rate of this indicator belonged to Ayatollah Rohani Hospital (69%). However, it was reported that in 2014, the largest proportion of hospital beds were occupied by the patients of Ayatollah Rohani Hospital (82%).

According to the Health Ministry standards, Ayatollah Rohani Hospital and the Children's Hospital of Amirkola were in average condition in 2011 and 2014, respectively while the other investigated centers were observed to be in desirable condition (table 3).

With reference to the bed turnover rate, the highest rate was observed in Rohani Hospital from 2011 to 2014 while Beheshti Hospital accounted for the lowest rate from 2011 to 2012. In 2013, the Children's Hospital of Amirkola was reported to have the lowest rate of bed turnovers while in 2014, this rate belonged to Yahyanejad Hospital. With regard to bed turnover intervals, Yahyanejad Hospital in 2011, Children's Hospital of Amirkola in 2012 and Yahyanejad Hospital in 2014 accounted for the highest rate, respectively. As for the patient's average length of stay, Beheshti Hospital exceeded the other centers from 2011 to 2013 while Yahyanejad Hospital had the highest average in 2014. The simultaneous survey of Pabon Lasso's indicators revealed that all the four health care centers studied from 2011 to 2014 fell under the 3rd area of the model (fig 1). With respect to the rate of bed turnovers and bed turnover intervals, all the surveyed health care centers were in desirable condition. As for the patient's average length of stay, Rohani Hospital was reported to be in average condition (2011-2013) and poor condition (2014). Similarly, all other centers were reported to be in poor condition from 2011 to 2014.

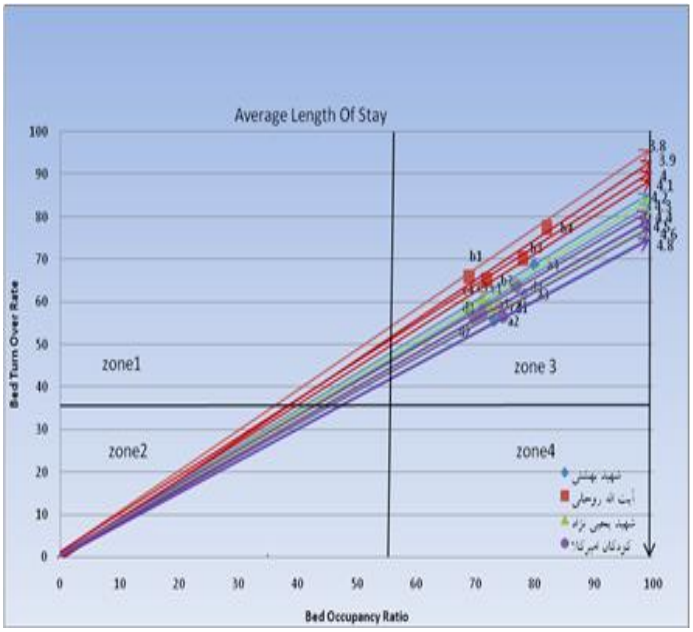

Figure 1. Location of health care centers affiliated to Babol University of Medical Sciences according to the Pabon Lasso Model from 2011 to 2014

The overall performance of Beheshti Hospital (a1-a4), Rohani Hospital (b1-b4), Yahyanejad Hospital (c1-c4) and Children's Hospital of Amirkola (1-d4)

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Table 3. Statistics of performance indicators of the teaching hospitals of Babol University of Medical Sciences, 2011-201

Center / Indicator	Beheshti		Rouhani				Yahyanejad						Amirkola			
	1389	1390	1391	1392	1389	1390	1391	1392	1389	1390	1391	1392	1389	1390	1391	1392
Bed occupancy (%) rate	71.5	73.1	78.2	79.9	69	72	78	82	72.31	73.49	71.18	69	74.75	69.85	71.1	77
Bed turnover (times) rate	59.6	55.7	61.77	68.8	66	65	70	77.4	59.63	58.63	61.11	58.82	56.7	56.3	57	63.67
Bed turnover interval(day)	1.7	1.8	1.1	1.1	1.7	1.6	1.2	0.9	1.95	1.78	1.9	2	1.58	1.93	1.81	1.33
Patient's average of length (day) syay	4.4	4.8	4.6	4.2	3.8	4	4.1	3.9	4.4	4.6	4.3	4.3	4.8	4.5	4.6	4.4

Discussion

Comparison of the performance indicators of the studied health care centers with the guidelines of the Ministry of Health during a 4-year period indicated that in terms of bed turnover rate and bed turnover intervals, all the hospitals were in desirable condition which is similar to the findings of Arzamani et al (7). By contrast, the rate of bed turnover in a psychiatric hospital was desirable while in a number of other facilities, it was reported to be in average condition according to the study of Kavosi et al. (12). With regard to bed occupancy rate (BOR) from 2011 to 2014, Ayatollah Rohani teaching hospital in 2011, Children's Hospital of Amirkola in 2012 and YahyaNejad Hospital in 2014 were reported to be in average condition while the other hospitals were in good condition. According to the findings of Kavosi et al., BOR was in desirable condition in 4 centers, it was in average condition in 2 centers and in 8 centers, it was reported to be in poor condition (12). As stated by Arzamani et al., BOR was above the national average (70%) in the northern part of Khorasan region (7) while in the study of Sadeghifar et al., BOR was reported to be in average condition (8).Apparently, the efficacy of BOR largely depends on the optimal use of the hospital resources by the management. Such examples of the parameters resulting in the increased BOR are customer request of services, installation and frequent use of beds in the hospital, suitable medical equipments, adopting a system of regular and dynamic services easily accessible for the patient and above all, customer satisfaction with the performance of the hospital. Therefore, since BOR appears to be in desirable condition in the health care centers affiliated to the university, preserving and promoting this indicator is recommended. Regarding the patient's average length of stay, Rohani Hospital was reported to be in average (2011-2013) and poor condition (2014) while all the other investigated centers were reported to be in poor condition during this period. In their research, Kavosi et al. investigated the average length of stay in a psychiatric hospital, as well as a number of other hospitals, which were reported to be in poor and desirable conditions, respectively (12). In another study conducted in the public hospitals of Jordan, Ajlouni et al. reported that out of 15 investigated hospitals, the performance of 7 and 9 hospitals had heightened in 2006 and 2007, respectively. The major problem in these centers was due to the prolonged hospitalization of the patients (19).According to the study of Arzamani et al., the average length of stay was reported to be within the normal range throughout the province (7) while the studied centers of Sadeghifar et al. were reported to be in desirable condition by a difference margin of 3.5 (8). According to the study of Kalhor et al., the average stay in a general teaching hospital from 2008 to 2011 was 4.3, 4.8 and 4.5 days, respectively (20). In the study of Barfar et al., bed turnover rate, BOR and the average length of stay were reported to be 85 times a year, 68.14% and 4.27 days, respectively (21). The standard of the average length of stay in hospitals depends on

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various departments according to the expertise and the type of the patients' disease (acute or chronic). However, certain shortcomings and practices upon admission might lead to an uncontrolled increase of this indicator. Such examples of these practices, which might also falsely raise the BOR, are unprepared routine examinations of the patients before admission, delays between the prescription of the physician and receiving laboratory results, prolonged clearance and settlement of the patients for any reasons, lack of coordination in the provision of equipments for the surgery, cancellations of operation room for any reasons and hospitalization of the patients who are not medically treatable. Therefore, since the average length of stay in the institutions affiliated to the university is in undesirable condition, it is necessary that every increase in this indicator be carefully examined and interventions be made in order to reduce this index.

It is also noteworthy that since it has a psychiatric ward for adults and children, Yahyanejad Hospital has a higher average length of stay in comparison to other health care centers in this study. In addition, having an ICU while lacking a Post-ICU section has resulted in an overall increase in the average length of stay in this ward which affects the hospital in all other sections. Similarly, having a Trauma ICU, an internal ICU and a kidney transplant section while lacking a Post-ICU have resulted in an overall increase in the patient's average length of stay in Beheshti Hospital. In the Children's Hospital of Amirkola, this problem is caused by the Neonatal Intensive Care Unit (NICU), Pediatric Intensive Care Unit (PICU) and a bone marrow transplant section which have influenced the average length of stay in this hospital. On the other hand, referrals of complicated patients from the surrounding regions, especially from the western part of the province, have lead to an overall increase in the average length of stay in this hospital.Investigating these health care centers according to the Pabon Lasso standards from 2011 to 2014 categorized all of them under the 3rd area of this model. In the study of Kavosi et al., 35.71% of the surveyed hospitals in Lorestan (5 centers) were reported to be classified under the same area as well (12) while Sajadi et al. classified 45% of their studied units (14 centers) under the 3rd area of the Pabon Lasso Model (14). According to the study of Goshtasebi et al. 2 out of 6 studied health care centers in Yasuj were reported to be in the same area of the model while Mehr-al-Hasani et al categorized 9 hospitals under this area (15, 18). In 2008, Kalhor and colleagues concluded that among all the health care centers affiliated to the Medical University of Qazvin, only one fit the 3rd area of the Pabon Lasso Model (20). Furthermore, using the Pabon Lasso Model, Barfar et al. classified 3 hospitals under the first area, 2 hospitals in the second area, 4 hospitals in the 3rd area and 2 hospitals under the 4th area (21). According to another study by Muhammadi et al., which was conducted during a 5-year period in Kermanshah, 36.75% of the surveyed health care centers were categorized under the first area, 15% were in the second area, 31.25% were in the third area and 17.5% were in the fourth area of the Pabon Lasso Model (22). According to the standards of the Pabon Lasso Model, it could be inferred that the educational and health care centers of Babol University of Medical Sciences have been able to exploit their resources in the most efficient manner. Of course, further attempt needs to be made in order to enhance the performance of these hospitals and the authorities should be committed to the permanent preservation of their facilities within the 3rd area of this model. Using the data obtained from the analysis of hospital performance indicators, we can achieve a better resource allocation and optimum efficacy of the existing hospital beds.

The results of the current study demonstrated that all the performance indicators in the surveyed health care centers were compatible to the standards of the Ministry of Health, with the exception of the patient's average length of stay, which was found to be in poor condition in general. Nevertheless, all the other indicators were classified under the 3rd category of the Pabon Lasso Model. Consequently, it is crucial that the patient's average length of stay be declined while all the other indicators be upgraded further to the north-east side of the diagram.

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References

Joneidi N, Sadeghi M, Izadi M, Ranjbar R. Comparison of Performance Indicators in One Hospitals of Tehran with National Standards. Iranian Journal of Millitary Medicine. 2011;12(4):223-8.

2.Jahani MA, Naghshine A, Naghavian M. Effect of Hospital Information System on Processes and Personnel Function from Users' Viewpoint in the Hospital Affiliated to Babol University of Medical Sciences, Iran; 2013. J Babol Univ Med Sci. 2014;16(7):63-70.

3.Mosadegh rad AM. Textbook of Hospital Organization and Management Specialized (2). Tehran: Dibagaran Culture and Art Institute; 2004. p. 213.

4.Dargahi H. Organization and comprehensive management of Hospital. Tehran: Omid Publishing Institute; 1999. p. 418.

5.Farajzadegan Z, Javadi A, Asgari G, Manzoori L. Indicators of Utilization as a Means for Assessment of Health Information Management Systems. Journal of Health Information Management. 2007;4(1):23-31.

6.National health indicators of the Ministry of Health & Medical Education, 2nd ed. Center of Statistical Management & Information Technology. 2008. [In Persian]. Available at: http://tim.mums.ac.ir/images/tim/newsitereaserch/fesfes-stu-file/15.pdf

7.Arzamani M, Pournaghi SJ, Seyed Katooli SM, Jafakesh Moghadam A. The Comparison of Indicators in Educational Hospitals of North Khorasan Universities of Medical Sciences with the Standards of the Country in 2011-2012. Journal of North Khorasan University of Medical Sciences. 2012;4(4):513-22.

8.Sadeghifar J, Rezaee A, Hamouzade P, TaghaviShahry SM. The Relation BetweenPerformance Indicators and Hospital accrediation Degree in UrmiaUniversity of Medical Sciences. Bimonthly Journal of Nursing& midwifery college of Urmia 2011;9(4):270-6.

9.Khamseh SA. Economic valuation of Iran naft industry hospitals imagined department Tehran. [Master thesis] Tehran: Islamic Azad University of Oloom Tahghight Tehran. 1999. [In Persian]

10.Farzandipour M, shaeri M, Rangrazjeddi F. Checking the Correctness of Statistical Indicatores in Hospitals at Kashan University of Medical Sciences. Journal of Allied Health Sciences of Tehran University of Medical Sciences. 2012;6(4):319-29.

11.Ebadi fard Azar F, Ansari H, Rezapour A. Survey the Cost of Inpatient Bed Days and Performance Indicatores in Selected Hospitals of Iran University of Medical Sciences. Journal of Management & Medical Information Science. 2003;7(18):37-43.

12.Kavosi Z, Goudarzi S, Almasian Kia A. Evaluating of Hospital Efficiency by Using of Paben Lasso Model in Lorestan University of Medical Sciences. Journal of Allied Health Sciences of Tehran University of Medical Sciences. 2013;6(5):365-75.

13.Zahiri M, Keliddar I. Performance Evaluating in Hospitals affiliated in Ahwaz University of Medical Sciences Based on Pabon Lasso Model. Quarterly Journal of Hospital: Iranian Association of Hospital Affairs. 2012;11(3):37-44.

14.Sajadi H, Sajadi Z, Hadi M. Is there any method to compare key indicators of hospital performance simultaneity? Health Inf Manage. 2011;8(1):71-81. [In Persian]

15.Goshtasebi A, Vahdaninia M, Maftoon F, Farzadi F. Assessing Hospital Performance by the Paben Lasso Model. Iranian Journal of Public Health. 2009;38(2):119-24.

16.Bahadori M, Sadeghifar J, Hamouzadeh P, Hakimzadeh S, Nejati M. Combining Multiple Indicators to Assess Hospital Performance in Iran using the Paben Lasso Model. Australasian Medical Journal. 2011;4(1):175-9.

17.Asbu E, Walker O, Kirigia J, Zawaira F, Magombo F, Zimpita P. Assessing the efficiency of hospitals in Malawi: An application of the Pabon Lasso technique. African Health Monitor. 2012;14(1):28-33.

[DOR: 20.1001.1.15614107.1393.17.3.9.6]
[DOI: 10.22088/jbums.17.3.76]

18.Mehralhasani M, Yazdi Feiz Abadi V, Barfe Shahrbabak T. Assessing Performance of Kerman Province`s Hospitals Using Pabon Lasso Diagram between 2008 and 2010. Quarterly Journal of Hospital: Iranian Association of Hospital Affairs. 2013;12(4): 99-107.

19.Ajlouni M. The relative efficiency of Jordanian public hospitals using data envelopment analysis Pabon Lasso diagram. Global J Business Res. 2013;7(2):59-72.

20.Kalhor R. Assessing Hospital Performance Using Pabon Lasso Analysis. International Journal of Hospital Research. 2013;2(3):149-54.

21.Barfar E, Khammarnia M, Baghbanian A, Panahi M. An Investigation of Performance at Hospitals Affiliated with Zahedan University of Medical Sciences; Using Pabon Lasso Technique. Medicine and Public Health Juornal. 2014;1(1): 31-7.

22.Mohammadi M, Ziapour A, Mahboubi M, Faroukhi A, Amani N. Performance Evaluation of Hospitals under Supervision of Kermanshah Medical Sciences using Pabon Lasoty Diagram of a Five-year Period (2008-2012). Life Science Journal. 2014;11(1):77-81.

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